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IRON AGE
JUNE 6, 1986
METALS PRODUCER

CONTINUOUS CASTING

a new generation debuts, an older one finds new life

UNRAVELING THE MYSTERIES OF SHEET STEELS

NORTH STAR STEEL:
SHINING BRIGHTLY IN THE GLOOM

FIRST QUARTER STEEL/NONFERROUS EARNINGS

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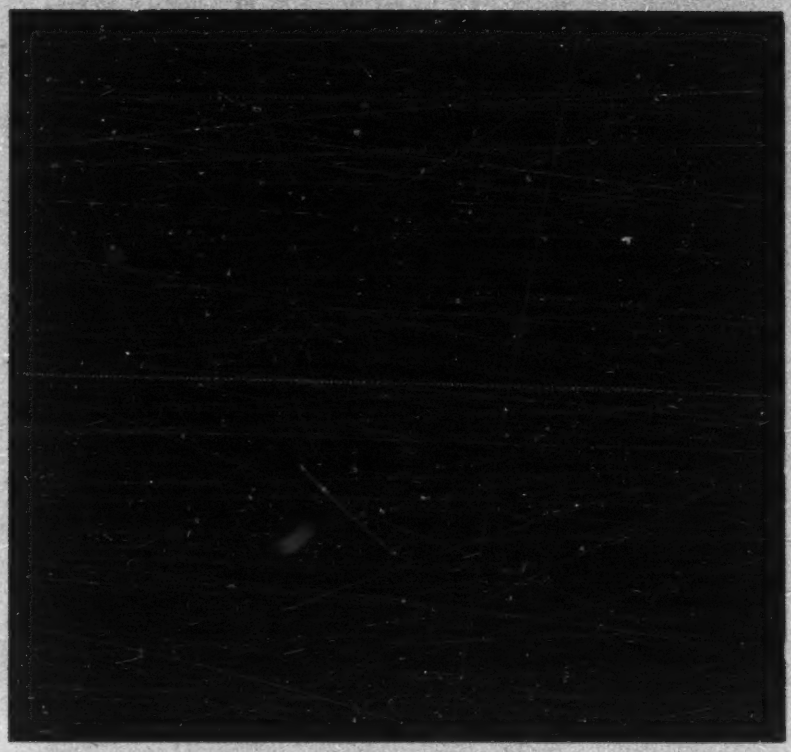

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1ST QUARTER EARNINGS

ANOTHER QUARTER OF RED INK

BY GEORGE J. MCMANUS AND ROBERT REGAN

Despite higher prices for steel, all six of the largest domestic producers lost money in the first quarter. Lower prices hold first quarter results of leading nonferrous metals companies in check.

Steel

In the first quarter of 1986, steel companies proved again they need the wage concessions being sought from the United Steelworkers of America.

All six of the largest mills lost money in the quarter. Steel prices improved a little but were still below the level needed for profitability.

The industry's financial plight drew a response from the Steelworkers. Labor costs were lowered in contracts negotiated by LTV Steel and National Steel Corp. Neither contract was ratified until the second quarter so it will be another three months before any effects are visible.

The effects of past concessions showed up in the earnings of two carbon sheet producers. Wheeling-Pittsburgh Steel Corp., which secured a $3 an hour cost reduction last year, earned $4 million in the first quarter.

Weirton Steel Corp., which reduced the pay of its owner-workers several years ago, continued to make money. Weirton's profit of $8.9 million came to 3.1 pct of sales.

There will presumably be labor cost reductions at United States Steel Corp. and the other large companies. Weirton's experience suggests the cuts could restore profitability.

However, it looks as though demand will lag again in the third quarter. If the price situation worsens, steel companies could wind up passing along their labor savings on to customers.

The extent of price cutting shows up fairly neatly in a comparison of shipments and sales. Steel shipments were up about 500,000 tons or 3 pct in the first quarter. Sales in dollars of the largest mills were down 7 pct. That works out to a 10 pct price reduction.

In the third quarter, steel companies may find out if there is a bottom to the price pit.

The biggest profit swing in the first quarter was at U.S. Steel. From earnings of $185 million in the first quarter of 1985, U.S. Steel went to a loss of $246 million in the 1986 quarter.

This change was marked by a switch in the profit mix. U.S. Steel has often complained that the profit problems of its steel operation were obscured by the profits of the oil division.

In 1986, the collapse of oil prices caused the company to devalue its petroleum inventories by $351 million. Buried under the oil losses was an operating profit of $8 million by the steel segment. This was better than a loss, but it was certainly nothing to shout about.

The problem, said U.S. Steel officials, was that while steel prices moved up 1 pct in the first quarter, they were still 10 pct below the first quarter of 1985.

"The lower transaction prices compared with the first quarter of last year reduced sales by nearly $140 million in the current year's first quarter," said David M. Roderick, chairman.

"Foreign steel imports continue to aggravate an already highly competitive domestic steel market," he added.

Mr. Roderick saw signs that the import restraint program was starting to work, but hard evidence of this was lacking. The 5.7 million tons imported in the first quarter came to nearly 24 pct of domestic supply.

Bethlehem Steel Corp. lost nearly $92 million in the first quarter. The operating loss of $36 million on steel was down a little from 1985, but there was a $14 million pension credit in 1986.

With Walter W. Williams as president and chief executive, Bethlehem is concentrating on the steel business. Mr. Williams doesn't see that the company has much choice because Bethlehem's "current financial condition precludes diversification away from steel in the foreseeable future."

Inland Steel Co., which lost $26 million in the first quarter, seems to be moving in the opposite direction. On April 28, it was announced that a holding company, Inland Steel Industries, Inc., was being created. This action doesn't mean "de-emphasis in our commitment to steel," said Frank W. Luerssen, chairman.

However, one purpose of the holding company is "to enter new businesses or to undertake joint ventures without encumbrances from existing businesses."

Until recently, Inland, like Bethlehem, had devoted itself almost entirely to the steel business.

Armco Inc. had a net loss of $62.9 million, but a large chunk of this came from a special charge of fabricating operations. Armco's specialty steel division was profitable and there was only a small operating loss on carbon steel.

(Sales and earnings table appears on p. 50B2; story continues on p. 50B3.)

STEEL: A LACKLUSTER FIRST QUARTER

FIRST-QUARTER PROFIT REPORT—1986 (In Millions of Dollars)

		EARNINGS			SALES		
	1985 E/S	1st Q 1986	1st Q 1985	Pct Change	1st Q 1986	1st Q 1985	Pct Change
USS	—	($249.0)	$185.0	—	$4,651.0	$4,984.0	–6.7
LTV	—	(109.1)	(156.4)	—	1,800.9	1,995.1	–9.7
BETHLEHEM	—	(91.8)	(62.1)	—	1,168.6	1,214.0	–3.7
ARMCO	—	(62.9	(22.5)	—	819.1	919.5	–11.0
INLAND	—	(26.4)	(6.3)	—	754.1	777.9	–3.1
NATIONAL	—	(39.4)	(39.8)	—	472.5	514.0	–8.1
TOTAL	—	(578.6)	(102.1)	—	9,666.2	10,404.5	–7.1
CYCLOPS	1.8	6.1	3.2	+93.0	337.5	320.5	+5.3
WEIRTON	3.1	8.9	10.2	–13.0	287.0	295.6	–2.9
INTERLAKE	3.3	7.6	7.0	+8.0	232.9	212.4	+9.6
WHEEL-PGH.	1.8	4.0	(25.8)	—	219.6	241.0	–9.0
NUCOR	6.4	12.0	10.2	+18.1	189.0	169.0	+12.0
CARPENTER	2.9	4.1	10.3	–60.0	141.7	147.8	–4.1
LUKENS	0.4	0.5	(0.4)	—	92.9	100.5	–7.6
COPPERWELD	—	(0.6)	(0.6)	—	85.4	97.7	–13.0
QUANEX	—	(5.1)	2.4	—	82.1	68.0	+21.0
FLORIDA	2.0	1.4	1.4	–2.1	71.8	69.1	+3.9
LACLEDE	0.4	0.3	1.5	–83.0	57.8	59.1	–2.1

( ) Indicates a loss

NONFERROUS: NOTHING TO WRITE HOME ABOUT

FIRST QUARTER PROFIT REPORT—1986 (In Millions of Dollars)

	EARNINGS			SALES		
	1st Q 1986	1st Q 1985	Pct Change	1st Q 1986	1st Q 1985	Pct Change
ALCAN	$27.0	$30.0	–10.0	$1,453.0	$1,408.0	+ 3.2
ALCOA	1.4	6.7	–79.1	1,177.3	1,313.9	–10.4
ALUMAX	19.3	10.1	+91.1	476.0	450.0	+5.8
AMAX	53.4	(35.2)	—	340.5	498.1	–31.6
ASARCO	(29.2)	(14.1)	—	291.6	260.7	+11.9
BRUSH WELLMAN	4.6	9.7	–52.6	56.0	68.5	–18.2
COMINCO	14.1	(0.6)	—	288.2	337.8	–14.7
CYPRUS MINERALS	13.0	(20.9)	—	191.1	145.8	+31.1
FALCONBRIDGE LTD.	25.0	12.2	+104.9	292.4	216.3	+35.2
FREEPORT MCMORAN	(133.2)	25.7	—	159.9	214.6	–25.5
INCO	(3.5)	12.1	—	375.0	384.0	–2.3
KAISER ALUMINUM	7.2	(25.5)	—	530.7	472.0	+12.4
NEWMONT MINING	8.6	3.1	+177.4	194.6	170.6	+14.1
NORANDA	21.4	(9.9)	—	875.4	874.4	—
OLIN	25.3	15.6	+62.2	451.4	472.7	–4.5
PHELPS DODGE	15.2	2.7	+463.0	230.9	223.6	+3.3
REYNOLDS METALS	14.3	7.0	+104.3	836.3	811.4	+3.1
SHERRITT GORDON	(2.4)	1.8	—	97.8	117.3	–16.6
VULCAN MATERIALS	6.9	6.0	+38.0	200.6	216.3	–7.3

( ) Indicates a loss

Alumax Inc.: Net for the 1986 quarter included $8 million in gains from pension plan settlements, principally involving termination of pension plans of two subsidiaries. **Amax Inc.:** Net for the 1986 quarter includes $80.1 million credit for cumulative effect of an accounting change on prior periods relating to recovery of excess assets in the company's pension plan for salaried employees. Loss from continuing operations was $26.7 million in the 1986 period and $43.0 million in the 1985 period. **Asarco, Inc.:** Loss for the 1986 period includes $9 million gain on exchange of securities and $3 million gain related to reduction of interest in a joint venture. Results for the 1985 period are restated to reflect change in method of accounting for certain pension costs. **Brush Wellman Inc.:** Results for the 1985 period are restated to reflect discontinued operations. **Cominco Ltd.:** Canadian funds. Net income includes extraordinary credit of $41.4 million in the 1986 period and $9.4 million in the 1985 period. Operating losses were $27.3 million vs $600,000. **Cyprus Minerals Co.:** Results for the 1985 period are stated on pro forma basis. **Falconbridge, Ltd.:** Canadian funds. Net for the 1986 period includes $42 million gain from sale of stock. **Freeport-McMoran, Inc.:** Net loss of 1986 period includes $149 million net writedown of oil and gas assets. **Kaiser Aluminum & Chemical Corp.:** Net for the 1986 quarter includes a pre-tax gain of $32.5 million from cancellation of a long term gas supply contract. **Newmont Mining Corp.:** Results include extraordinary credits of $922,000 in the 1986 period and $430,000 in the 1985 period from tax-loss carryforwards. Net for the 1985 period included $701,000 loss from discontinued operations. **Noranda Inc.:** Canadian funds. Net for the 1986 period includes $25.6 million gain on sale of investments. **Phelps Dodge Corp.:** Net for the 1986 period includes $6.2 million extraordinary credit from tax-loss carryforwards. **Reynolds Metals Co.:** Net for the 1986 period includes $4.2 million tax benefit from tax-loss carryforwards. Net for the 1985 period includes net gain of $2.5 million from settlement of litigation. **Sherritt Gordon:** Canadian funds.

National Steel Corp. had a net loss of $39.4 million. National expects to benefit in May and June from a labor cost reduction of $1.51 under the new contract.

The 40-month contract of LTV Corp. will reduce cash costs by $3.60 an hour and increase the company's cash flow by $125 million a year. After losing another $109 million in the first quarter, LTV is obviously in need of a cost reduction.

The electric furnace producers of carbon steel were generally profitable in the first quarter. Nucor Corp., Florida Steel Corp., and Laclede Steel Co. all made money with Nucor leading the parade.

Cyclops Corp., Interlake, Inc., and Lukens, Inc., were profitable.

Nonferrous

Low prices for base metals held first quarter results of leading nonferrous metals companies in check.

There was no discernible trend in sales volume. And in cases where net income was up, the reasons were varied. These ranged from a net gain on cancellation of an energy contract through recovery of excess assets in pension funds to profits on sales of securities or investments.

There was some improvement in base aluminum and copper prices during the initial 1986 period, but the difference with depressed levels of the corresponding 1985 quarter was nothing to write home about.

Nickel prices, on the other hand, were weaker—particularly on the hedge markets—and there was no real price recovery in molybdenum, silver, lead, zinc and other base metals.

Phelps Dodge Corp. credited a jump in first quarter profits by its primary metal operations to $20.6 million from $10.9 million to lower unit production costs and better copper prices. The company's sales of mined copper were up nearly 10 pct to 96,900 tons.

Phelps Dodge executives said they had $75.2 million in cash and short term investments at the end of the quarter, compared with $29 million a year earlier.

The company received $75 million during the 1986 period from the sale of a 15 pct interest in its Morenci, Ariz., copper mining complex to Japanese interests. The company also repaid the balance of $30 million of bank debt under revolving credit agreements during the quarter. Its indebtedness under revolving credit agreements was $140 million a year earlier.

Asarco, Inc., reported that a substantial portion of its $29 million loss reflected equity accounting for results of associated companies—specifically foreign currency translation losses due to the weakening U.S. dollar.

The company noted that foreign currency accounting adjustments represent neither gains nor losses and do not affect the underlying financial position.

Asarco officials said of its four major metals, only copper showed any price improvement, with lead and silver prices down marginally and zinc down about 26 pct.

Newmont Mining Corp.'s U.S. and Canadian nonferrous metals operations were in the red. Company spokesmen blamed continued low copper prices. The impact was countered by a strong showing by the company's two gold interests, which benefited from doubled production and better gold prices.

Aluminum Co. of America, which squeaked out a $1.4 million profit in the first quarter, stated that it is "moving through a transition period from declining prices to an environment of firmer prices."

The company noted that prices on new orders for many fabricated items were up 5 pct since the start of the year, an important exception being can stock. Alcoa made commitments toward the end of the year at prices below fourth quarter 1985 levels. These price commitments, made for competitive reasons, were extended to mid-year, Alcoa said. □

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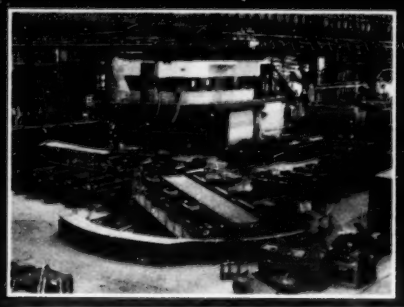

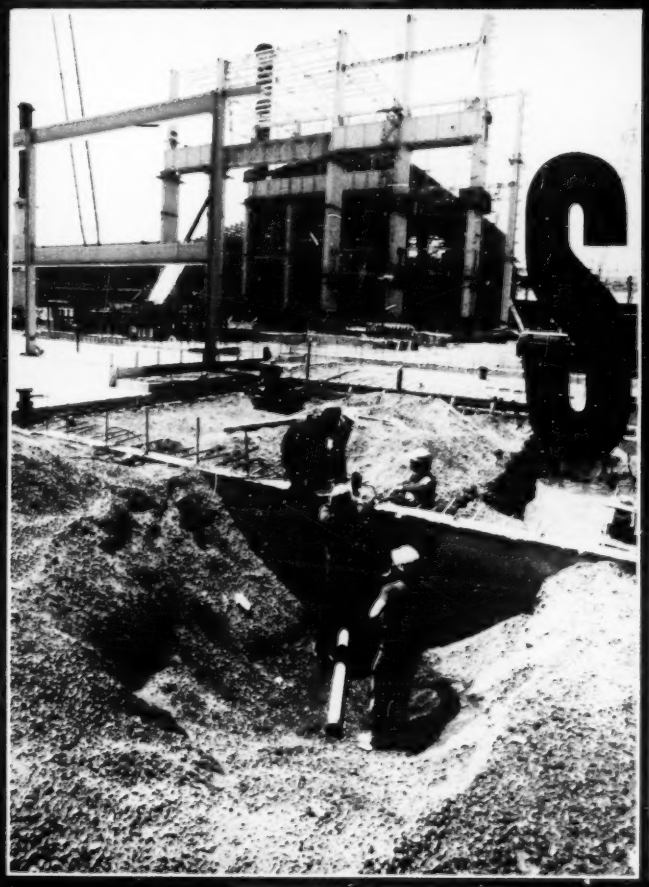

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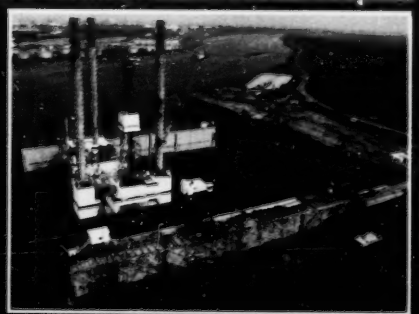

...DESPITE HARD TIMES

ADVANCES IN STEEL TECHNOLOGY

DETAILS ON THE USS/POSCO PLANT

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AISE CONVENTION ISSUE

OPERATION BOOTSTRAP:

STEEL SPENDING...

...DESPITE HARD TIMES

BY GEORGE MCMANUS

When you start adding things up, the steel industry has been doing a remarkable amount of modernizing.

This year's *Iron Age* survey of new facilities turned up 11 big continuous casters, 13 ladle metallurgy systems and five electrogalvanizing lines.

It goes without saying that these massive new units are equipped with sophisticated process controls. New controls are also going on existing facilities of large and small companies.

In El Paso, Border Steel Mills, Inc., is installing a distributed computer control system. Lukens, Inc., is automating its 110-inch plate mill and its 140-inch plate mill. Lukens is applying distributed control and materials tracking throughout its operation.

In addition to specific modernization projects on its 80-inch hot strip mill and 56-inch tandem mill, Inland Steel has completed more than a dozen automation projects. National Steel has put shape control on cold mills at Great Lakes, Midwest, and Granite City.

A sleeper in the steel picture is eccentric bottom tapping of electric furnaces. Seven furnaces are being converted to bottom tapping.

There are other active areas, but continuous casting is clearly the dominant element is the current modernization. According to the American Iron & Steel Institute (AISI), more than 48 pct of the domestic steel output was continuously casted in March 1986. That compared with 20 pct in 1981.

Considering the depressed state of the industry, the rapid conversion to continuous casting is impressive. Much of the impetus for the caster programs and all recent spending has come from rising customer quality standards.

Quality was a major consideration in the decision of USX Corp. to spend $300 million at Gary Works on a casting complex with capacity of 3.3 million tons.

"This caster gives us the continuous quality capability we need to meet those customer requirements," said Thomas C. Graham, president of USS.

Cost reduction is, of course, a major factor. The savings with continuous casting average around $50 a ton. For the U.S. industry as a whole, the casters now in place should reduce costs by more than $1.7 billion in 1986.

This helps explain why the cost of producing carbon steel has been cut $75 a ton since 1982. Since 1972, modernization has reduced energy consumption by 26 pct to 24.6 million Btu a ton.

The two biggest projects now underway in North America are the $300 million cold finishing system of USS-POSCO Industries at Pittsburg, Calif., and the new $750 million primary complex of Dofasco at Hamilton, Ont.

In both cases, the companies are taking advantage of clean slates to arrange facilities in a manner that permits a continuous flow of steel from one step to another.

The USS-POSCO mill reflects this trend toward close coupling, but it also reflects the different trend away from full integration and self-sufficiency. Hot bands for the mill will come from Korea.

California Steel Industries, Inc., and Tuscaloosa Steel are among the others relying entirely on outside sources for semifinished material. Weirton Steel Corp. is operating without coke ovens. The big mills tend to regard captive iron ore operations as burdens rather than assets.

The mini-mills continue to broaden and upgrade product lines. The most dramatic developments are at Nucor Corp., where casting programs are aimed at near net shape casting of sheet and heavy structural steel.

The new Fort Smith mill of Quanex Corp. is equipped for vacuum arc degassing, ladle injection and argon stirring.

At Monroe, Mich., North Star is

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installing a ladle furnace and converting an arc furnace to eccentric bottom tapping. In Youngstown, North Star is building the world's first mini-mill for oil country seamless casing.

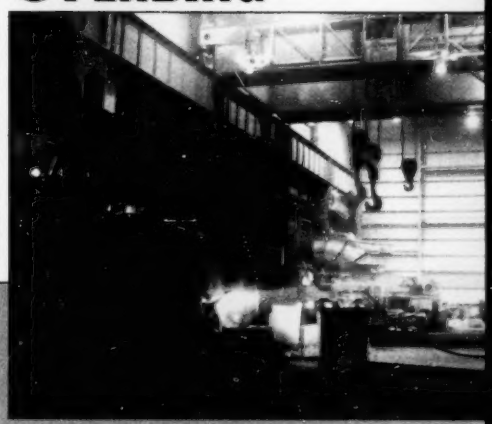
Dofasco

At Hamilton, Ont., Dofasco is building a complete new steel mill. The hot end of this monumental undertaking is well advanced. The cold finishing complex will come later.

To facilitate direct rolling, Dofasco is positioning its new continuous caster near the new hot strip mill. "From the cut-off of the caster to the roll bite of the roughing mill will be about 330 meters," said David H. Samson, engineering vice president for Dofasco.

The caster will be served by a

STEEL SPENDING



Timken completed construction of its $500 million Faircrest plant last year.

Despite an absence of profits, the steel industry has somehow managed to continue modernizing at a brisk rate. Here's a list of the projects completed or initiated since the start of 1985:

ACME STEEL CO.

A recently completed $15.5 million expansion program included:
–Stelco Coil Box added to strip mill.
–Slab and billet grinder.
–Two new slitter-painter lines for strapping.

ALLEGHENY LUDLUM STEEL CORP.

In the five years Allegheny Ludlum has operated as an independent specialty steel manufacturer, it has reinvested over $95 million in new and modernized facilities. These have included:

West Leechburg, Pa.
–A new state-of-the-art annealing and pickling facility.
–Modifications of slitting, bundling and shipping stainless strip.

Lockport, N.Y.
–Purchase and renovation of former Guterl Steel facility.

Claremore, Okla.
–An expansion of the tube facility.

Wallingford, Conn.
–A horizontal strip bright annealing line.
–New tension leveling line.
–Light gage slitting line.

Brackenridge, Pa.
–A downcoiler pinch roll assembly.
–Electrical renovation on a 56-inch. hot strip mill.
–Screwdown position regulators on a 56-inch cold tandem mill.
–Arc furnace aisle crane upgrade.
–Cell scale installation.
–Upgrade 25KV power distribution system, continuous caster water supply, and compressed air systems.

New Castle, Ind.
–Terminal assemblies for Sendzimir mill.
–Modifications to wet strip grinding and polishing line.

ARMCO INC.

Middletown, Ohio
–A new electrogalvanizing line, built at a cost of $50 million.

Butler, Pa.
–A $55.8 million state-of-the-art cold rolling mill.

BABCOCK & WILCOX, TUBULAR PRODUCTS DIV.

Alliance, Ohio

A $28 million modernization program includes:
–10/34-inch heavy wall welding mill.
–An induction heating unit.
–A 26-stand hot stretch-reducing mill.
–A 500,000-pound drawbench.
–A full-periphery ultrasonic testing unit.
–Several units of highly automated finishing equipment.

Koppel, Pa

A $14 million bar finishing facility includes:
–Quench Furnace.
–Temper Furnace.
–Rotary Straightener.
–Related finishing equipment.

No. 4 Melt Shop – $80 million modernization includes:
–An 80-ton ultra-high-powered furnace.
–A ladle refining station.
–A four-strand continuous bloom/bar caster.
–A state-of-the-art computer hierarchy.

BETHLEHEM STEEL CORP.

1985/86 major capital projects for Bethlehem totaled $770.5 million. Projects included:
–Installation of two slab casters.
–Modernization of a structural mill.
–Addition of new facilities.
–A new electrogalvanizing line.

Sparrows Point, Md.
–A $260 million continuous slab/bloom caster.

Burns Harbor, Ind.
–A $250 million continuous slab caster.
–A $14 million BOF shop ladle handling and treatment facility.
–A $13.5 million hot metal desulfurization station.

Steelton, Pa.
–An $18 million, long-length rail manufacturing facility.

Bethlehem, Pa.
–A $50 million modernization of the 48-inch structural mill.

Walbridge, Ohio
–An $82 million electrogalvanizing line, which is a joint venture of Bethlehem Steel, Inland Steel and Pre-Finish Metals, Inc.

Port Arthur, Tex.
–A multi-million dollar drydock at the Sabine Yard.

BORDER STEEL MILLS, INC.
–A heat treat line has been installed.
–A baghouse installation is in progress.

degassing system that places ladles inside a vacuum chamber and produces very low carbons.

Steel will flow from the ladle into a single tundish. "We want a very big tundish obviously," said Mr. Samson.

The tundish will feed two strands. "We'll be able to adjust widths on the fly and have all the shrouding, of course," said Mr. Samson. "There will be automatic mold level control and automatic tundish control."

Coming out of the molds, the slabs will be subjected to mild, air mist cooling and travel in insulated passages. "We cool it only enough to make a formable skin," said Mr. Samson. Closely spaced segmented rolls will support the strand, which will leave the caster at more than 1,000°F.

Dofasco won't be direct rolling right off the bat. "We have to have edge heating and we won't have that initially," said Mr. Samson. He feels the company must walk before it tries to run.

"First, we must learn to make slabs and then quality slabs and then predictable quality slabs and then enough of them to match the capability of the strip mill."

It will take a couple of years to reach the final point, but Dofasco is already equipping its strip mill for direct rolling.

"We're putting in stands six and seven with hydraulic screwdown," said Mr. Samson. "The existing stands four and five will have hy-

–A distributed computer control system is being implemented.

CARPENTER TECHNOLOGY CORP.

Capital improvements in 1985 totaled about $125 million. This covered:
–A bar finishing building with a centerless bar turner, straightening press, bar polisher and abrasive cut-off machine.
–The reversing mill portion of the new No. 5 Hot Mill is in production.
–Coil-to-bar cold drawing equipment.
–A sludge drying process for the waste treatment plant.
–Ladle heaters.

CF&I STEEL CORP.

–A 540,000 ACFM baghouse transferred from the BOF to arc furnace.
–First commercial production of head-hardened railroad rail in the U.S. in the third quarter of 1986.

CHAPARRAL STEEL CO.

Chaparral continues to invest 15 pct of pre-tax profits. The company expects to produce and ship 1.2 million tons of finished product in fiscal year ending May 1987. This will be up from 1.087 million tons in the year ending May 1986.
Projects include:
–Addition of two continuous casting strands to accommodate 1.5 million tons of melting capacity.
–Conversion this summer of one furnace to eccentric bottom tapping, increasing capacity from 115 tons before to 150 tons.
–Addition of more wide flange beam sizes on section mill.

CYCLOPS CORP.
Coshocton Stainless Division

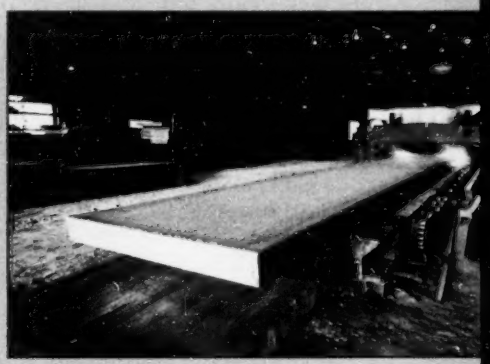
–A $27 million expansion program announced in January 1985 included.
–A 52-inch reversing Z-mill which should be operating in September.
–A 48-inch tunnel annealing furnace, scheduled for 1987.
–An additional 36-inch bright annealling line.
–A modified unibrite line.
–A new grinder and slitter.
–More than 45,000 sq ft of new production area under roof.

DOFASCO INC.

A $750 million (Canadian dollars) major expansion and modification program underway at Dofasco includes:
–A new continuous casting facility.
–A new No. 4 Pickle Line.
–Additional stands to the new No. 2 Hot Strip Mill.
–Two 350-ton slab furnaces.
–Additional equipment to No. 2 Melt Shop.
–No. 4 BOF vessel together with ladle metallurgy.
–A ladle heating station with a top argon lance.
–A new charging crane.
–Scrap yard facilities.

FLORIDA STEEL CORP.
Tampa, Fla.

–A 35-ton alternating current electric arc furnace was converted to direct current operation in March 1986.
–Plans were announced to relocate the Tampa Reinforcing Steel Fabricating Plant and Division Offices in June 1986.
Jacksonville, Florida
–A new rod rolling mill became operational in September 1986.
Charlotte, N.C.
–A new rolling mill became operational in May 1985.
–Plans were announced to relocate the Charlotte Reinforcing Steel Fabricating Plant and Division Offices in early 1987.



Lukens is modernizing its slab caster and automating two plate mills.

KEYSTONE STEEL & WIRE CO.

–Addition of AMB spray-cooled molds and mold level controls to the continuous caster.
–Installation of water-cooled oxygen lances for the arc shop.
–Restoration of pouring reels.
–Modernization of billet yard has included: Installation of radio controls for cranes, an upgrading of crane capacity as well as new lifting devices.

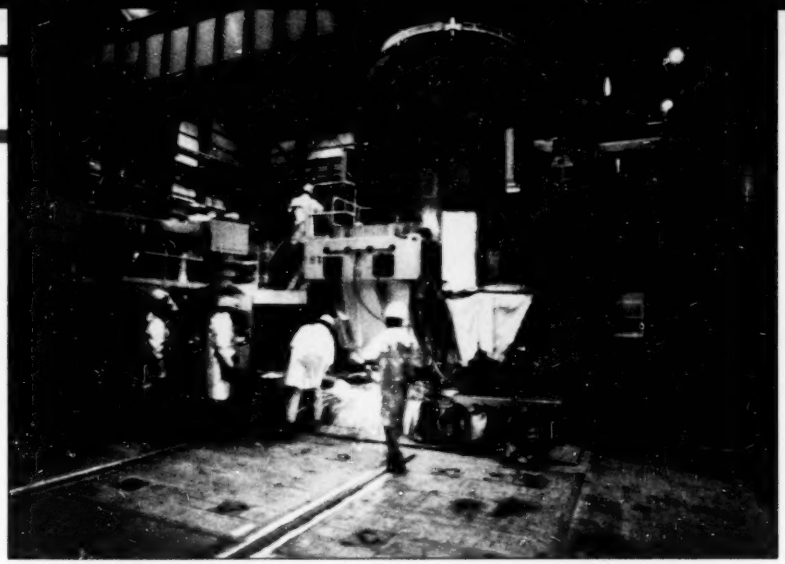
STEEL SPENDING

draulic screwdown. All stands will have work roll bending and hydraulic work roll shifting."

Work roll shifting will facilitate direct rolling by permitting schedule-free operation. "You can do almost as much as with a six-high mill," said Mr. Samson.

Process Control

Basic steel is probably the most advanced of any industry in its use of computer controls. The sophistication of modern steel controls is brought out by this de-



Inland has installed a slab caster and a combination slab/bloom caster.

–Installation of cover on caster ladle.
–Purchase of coil compacter for rod dock shipping.
–Installation of variable speed drive on furnace fan.

INLAND STEEL CO.
–A $26.5 million metallurgy station.
–A slab caster and a combination slab/bloom caster.
–A $17 million modernization project at the 56-inch Tandem Mill.
–Improvements at the 80-inch Hot Strip Mill.
–More than a dozen process automation installations were completed.
–Additional improvements at No. 4 BOF and at No. 4 Slabbing Mill.
–Overall environmental projects underway or completed totaled $27 million. These included: A coke side shed at No. 11 Coke Oven battery, an electrostatic precipitator at No. 9 Coke Oven battery, a secondary emissions control system, and Phase III of a waste water recycle system.

LACLEDE STEEL CO.
An estimated $4.4 million was spent during 1985 for plant modernization, with another $9.6 million projected to be spent during 1986. Major projects include:
–Revamp of the continuous casting facility.
–Completion of water cooled roofs.
–Providing alloy additive system.
–Rebuild of soaking pits.

LTV STEEL CO.
Cleveland, Ohio
–An electrogalvanizing line.
–BOF vessel bottom stirring - No. 2 BOF.
–C-6 Blast Furnace reline.
Canton, Ohio
–Ladle metallurgy station.

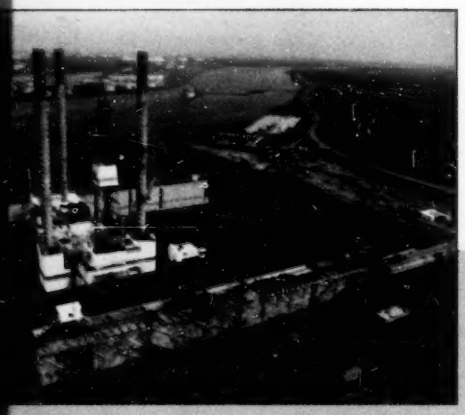
LUKENS, INC.
–Complete rebuilding of 165-ton furnace completed.
–Automation of 110-inch plate mill due for completion in summer of 1986.
–Automation of 140-inch plate mill will start in late 1986 or early 1987.
–Modernization of slab caster.
–Broad application of distributed controls and materials tracking systems.

MCLOUTH STEEL PRODUCTS CORP.
–Hot mill computer.
–An iron desulfurizing station.
–A 350-ton per hour slab heating furnace.
–A ladle metallurgy station.
–New data logging equipment.

NATIONAL STEEL CORP.
Projects completed or launched by National since the start of 1985 totaled more than $365 million.
Great Lakes Division
–A $120-million electrogalvanizing line began operation on December 26, 1985.
–An additional $20 million was spent to upgrade other steelmaking and rolling processes.
–Construction began in 1985 on a $200 million continuous caster and ladle metallurgy system. The caster is scheduled to begin operation in mid-1987.
–Ground was broken in May 1986, for a hot metal desulfurization station.
–Shape controls were installed on the No. 3 Temper Line.
Granite City Division
–A desulfurization station was completed and began operation early in 1986.
–A ladle metallurgy station went on-stream in August.
–Shape controls were installed on the tandem mill.
Midwest Division
–In 1985, $25 million of a $100 million corporate-wide, computer-based process control and management system was invested. Process controls have been installed on a number of operations in the past year and are currently running the galvanizing lines.
–Operation of a tension leveler began on August 27, 1985.
–Shape controls were installed on the 80-inch tandem mill.

NEW JERSEY STEEL CORP.
An expansion program announced in June 1986 will increase capacity from 350,000 tons a year to 500,000 tons a year. New facilities will include:
–An electric furnace with eccentric bottom tapping.
–Scrap cranes.
–A runout cross transfer and cooling

STEEL SPENDING



Bethlehem has built a multi-million drydock at its Sabine Yard in Texas.

bed.
–Provision for hot charging billets.

NORTH STAR STEEL CORP.

Youngstown, Ohio
–Idle mini-mill of Hunt Energy Co. acquired for $22.5 million and renamed North Star Steel Ohio.
–$80 million program will equip mill to make 250,000 tons of seamless oil country casing.
Beaumont, Tex.
–A $3 million update of rolling mill completed as part of $25 million improvement program.
–A $4.5 million melt shop project that includes conversion to eccentric bottom tapping.
Monroe, Mich.
–A $28 million program includes conversion to eccentric bottom tapping, a ladle furnace, and billet caster improvements.
Calvert City, Ky.
–Entered medium structural market by acquiring 80 pct of stock of Ohio River Steel Corp.

NORTHWESTERN STEEL AND WIRE CO.

–A six-strand bloom caster.
–An eight-strand billet caster.
–Seventeen insulated hoods on the rod conveyor line of 12-inch mill.
–Ladle refining at the continuous caster department, a computer-assisted operation.
–Plans for a $4 million capital improvement program for the Wire Products Division were announced by Northwestern. The project to be completed during fiscal year 1987, includes: Construction of a new cleaning house for rod; purchase of new wire drawing machines, updating the wire annealers, new nail cutting machinery, reorganizing existing nail manufacturing equipment.

NUCOR CORP.

Capital spending was $29.1 million in 1985 and $26.1 million in 1984. Projects include:
–New 600,000-ton structural mill under consideration.
Indiana
–$25 million fastener plant.
Darlington, S.C.
–Hazelett thin slab caster.
–Continuous steelmaking program.
Jewett, Tex.
–Eccentric bottom tapping conversion.
Plymouth, Utah
–Bar mill added.

QUANEX CORP.

The MacSteel Division of Quanex dedicated a complete new 280,000 bar mill at Fort Smith, Ark., in April 1985. Facilities include:
–A rotary continuous caster.
–A vacuum arc degassing system.
–Scanlance ladle injection and argon stirring.
–A 10-stand rolling mill.

RARITAN RIVER STEEL CO.

A $5 million project covers:
–A new billet conditioning facility.
–A remodeled 30,000 sq ft building.
–A B.C.P. shotblaster.
–A C.M.I. grinder.

ROUGE STEEL CO.

–Two-strand, $150 million slab caster.
–Double Eagle Steel Coating Co., a joint venture with USS, started $200 million, 700,000-ton electrogalvanizing line in April 1986.

STEEL OF WEST VIRGINIA, INC.

–$20 million automation of special section mill and fabricating equipment.
–Automation of a 21-inch special section hand mill.
–Installation of a 32-inch breakdown mill.
–Installation of a 32-inch universal finishing stand.
–Installation of equipment to paint and fabricate cutting edges, track shoes, turnouts, cross-members, and sub-frames.

SHARON STEEL CORP.

–A PEC hot metal desulfurization unit.
–Installed Lectromelt water cooled panels.
–New electrode arms.
–A second ladle preheater.
–Installed Peabody electrostatic oilers.
–An Accu-Ray 7000 thickness gage.
–An Ideal Corp. resistance butt welder.

STELCO INC.

Hamilton, Ontario
–A $60 million program to modernize No.1 bar mill includes:
–A new hearth-walking beam furnace.
–Twelve new roughing and intermediate stands.
–No. 2 cold shear, coiling and coil

scription of the computer system for the new slab caster at the Gary Works of USX Corp.

"At the rate of 1.5 million instructions per second, each of the three new superminicomputers make up the heart of the new control systems....

"The Level Two computers controlling Q-BOP and caster operations, as well as receiving and analyzing volumes of data which include the latest in tracking and quality information, receive information from more than 100 programmable logic controllers.

"These Level One micro-computing units include everything from the units tied into chemical analysis and testing at the chemical laboratory to the operator consoles which provide a window to every aspect of the process.

"Nearly 9 billion bits of information can be kept in on-line disk files with real-time access. The

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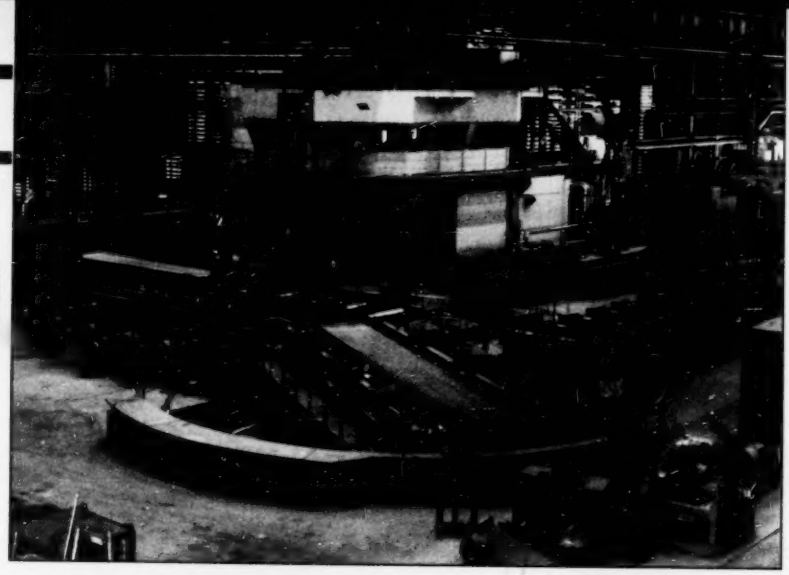
computer tracking is so thorough that data will be assembled for each foot of steel cast by the lines and it will include approximately 200 variables with such information as chemistry, temperature, speed of the line....

"Running at capacity," the explanation concluded, "the computer tracking information could amount to as much as a catalog of 800 million variables on slabs produced annually." □



Bethlehem has installed a continuous slab caster at its Burns Harbor plant.

handling equipment.
–A $280 million continuous casting facility includes:
–One slab caster.
–Combination slab/bloom caster.

Lake Erie Works
–A $40 million quality improvement program is underway for the 2050 mm hot strip mill. This includes: Addition of a fifth finishing stand, increased horsepower on existing four finishing stands, and hydraulic automatic gage control.

STRUCTURAL METALS, INC.
–100-135 ton-per-hour walking beam reheat furnace.
–100/135 ton-per-hour cooling bed.
–Billet weighing system.
–Mill speed up to 2,500 fpm.
–Additional finishing facilities.
–Electric furnace modification.
–Sixteen pass in-line mill.

TELEDYNE ALLVAC
–A new rolling mill, the 26/36-inch Precision Rolling Mill, was recently completed.
–Rotary hearth furnace added.
–A joint venture with Teledyne Vasco, which began in December 1985 includes a 25-ton AOD facility in Latrobe, Pa.

THE TIMKEN CO.
Canton, Ohio
–A $500 million construction project, Faircrest Steel Plant, was completed and is operating.

Harrison Steel
–A ladle refining system.

TUSCALOOSA STEEL CORP.
–New $75 million mill to roll 112-inch wide coiled plate.

USX CORP.
Braddock, Pa.
–Reline and improvements to No. 3 Blast Furnace.

Dearborn, Mich.
–Electrogalvanizing line joint venture with Rouge Steel.

Gary, Ind.
–New slab caster.
–New ladle metallurgy complex.
–Reline and improvements to No. 7 Blast Furnace.

Fairfield, Ala.
–New slab caster being engineered.

Pittsburg, Calif.
–USS-POSCO Industries, a joint venture with Pohang Iron & Steel, is building a $300 million cold finishing complex.

Jackson, Mich.
–Joint venture with Worthington Industries will provide first operation blanks to auto plants.

West Mifflin, Pa.
–Modernization of Galvalume line.

WASHINGTON STEEL CORP.
Washington, Pa.
–A revamping of the No. 3 A & P Line, completed.
–New terminal equipment installed.
–Catenary annealing furnace began operation in March 1985.
–Microprocessor based automatic gage control added to the No. 3 Sendzimir Mill, also equipped with new isotope thickness gages, began operation in March 1986.

Houston, Pa.
–Completed a repowering of the reversing roughing mill on the Hot Strip Mill.

WEIRTON STEEL CORP.
Weirton will spend $78.8 million on capital improvements in 1986. Projects include:
–External desulfurization system due for late 1987 start-up.
–Two BOFs being equipped for bottom stirring.
–Two vacuum degassers being upgraded and equipped for reheating.
–$17 million modification of continuous caster completed.
–Upgrading of hot strip mill includes gage and shape controls, reheat retention covers, and water cooling system.
–No. 8 Temper Mill being installed on hot strip mill.
–Scanning X-ray gages being installed on hot strip mill.
–Closed loop coating weight system being added to one timing line. Microprocessors on other lines monitor coating weight during application. All lines will eventually have closed loop system.

WHEELING PITTSBURGH STEEL CORP.
–A 60-inch, 270,000-ton cooling line due for late 1987 start.

Monessen, Pa.
–New melting facilities under consideration.